

CLAIMS

1 1. A therapeutic treatment device comprising an
2 incoherent light source operable to provide a pulsed
3 light output for treatment.

1 2. The treatment device of claim 1 further
2 comprising a housing with an opening, said light source
3 being disposed in said housing, and said housing being
4 suitable for being disposed adjacent a skin treatment area.

1 3. The treatment device of claim 2 further
2 comprising a variable pulse width pulse forming circuit
3 electrically connected to said light source.

1 4. The treatment device of claim 3 wherein said
2 variable pulse width pulse forming circuit comprises a
3 plurality of pulse forming networks.

1 5. The treatment device of claim 3 further
2 comprising a reflector mounted within said housing and
3 proximate said light source.

1 6. The treatment device of claim 5 further
2 comprising at least one optical filter mounted proximate
3 said opening.

1 7. The treatment device of claim 6 further
2 comprising an iris mounted about said opening.

1 8. The treatment device of claim 7 including
2 means for providing controlled energy density, filtered,

3 pulsed light output through said opening and said iris to a
4 skin area for treatment.

1 9. The device of claim 8 wherein said light
2 source is a flashlamp.

1 10. The device of claim 3 wherein said variable
2 pulse-width pulse forming circuit includes means for
3 selecting a pulse width effective for a treatment of a
4 disorder in the immediate vicinity of the skin.

1 11. The device of claim 9 wherein said light
2 source comprises means for providing pulses having a width
3 in the range of between substantially 0.5 and 10 microsec
4 and an energy density of the light on the skin of up to
5 about 10J/cm², whereby the light ^{TREATS} ~~ablates~~ external disorders
6 of the skin, SUCH AS: TATTOOS, PIGMENTED LESIONS OR BIRTH AND AGE MARKS.

1 12. The device of any of claims 9 wherein said
2 light source comprises means for providing a pulse in the
3 range of about 0.5msec to 100msec, whereby blood vessels
4 proximate the skin may be coagulated.

1 13. The device of claim 9 wherein said at least
2 one filter includes means for providing a light spectrum
3 having a significant portion of its energy in the wavelength
4 range of substantially 550 to 650nm.

1 14. The device of claim 9 wherein said at least
2 one filter includes means for providing a light spectrum
3 having a significant portion of the energy in the wavelength
4 range substantially greater than 650nm.

1 15. The device of claim 9 wherein said light
2 source further comprises a fluorescent material disposed
3 about said flash lamp, said fluorescent material being of
4 the type that absorbs radiation emitted by said flashlamp
5 and emits radiation in a range effective for skin
6 thermolysis and coagulation of blood vessels in the skin and
7 immediately thereunder, wherein said optical filters are of
8 the type that absorb radiation in the wavelength range of
9 substantially less than 500nm.

1 16. The device of claim 5 wherein said reflector
2 has a reflectivity which varies as a function of wavelength.

1 17. The device of claim 9 further comprising
2 means for changing the current density in said flashlamp.

1 18. The device of claim 9 further comprising a
2 power supply connected to and external of said housing,
3 wherein said housing includes a handle.

1 19. A method of treatment with light energy
2 comprising the steps of:
3 providing a pulsed light output from a non-laser,
4 incoherent light source; and
5 directing said pulsed light output to a treatment
6 area.

1 20. The method of claim 19 further comprising the
2 steps of:
3 controlling the pulse-width of said pulsed light
4 output;

5 focusing said light source for controlling the
6 power density of said pulsed light output; and
7 filtering and controlling the spectrum of said
8 pulsed light output.

1 21. The method of claim 20 wherein the step of
2 directing includes the step of directing said pulsed light
3 to blood vessels in the vicinity of the skin.

1 22. The method of claim 20 wherein the step of
2 directing includes the step of directing said pulsed light
3 to skin irregularities.

1 23. The method of claim 20 wherein said pulse-
2 width controlling step achieves effective treatment of a
3 disorder of the skin.

1 24. The method of claim 21 wherein said step of
2 controlling the pulse width includes the step of providing a
3 pulse width in the range of about 0.5-10 microsec with
4 energy density of the light on the skin on the order of
5 about 10J/cm², whereby the skin is treated.

1 25. The method of claim 22 wherein said step of
2 controlling the pulse width includes the step of providing a
3 pulse width in the range of substantially 0.5msec to
4 100msec, whereby blood vessels ~~in the skin~~ are coagulated.

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1 26. The method of claim 21 wherein the step of
2 filtering and controlling the spectrum includes the step of
3 providing a spectrum substantially in the wavelength range
4 of 550 to 650nm.

1 27. The method of claim 22 wherein the step of
2 filtering and controlling the spectrum includes the step of
3 providing a spectrum substantially in the wavelength range
4 of greater than 650nm.

1 28. The method of claim 20 further including the
2 steps of:

3 providing a fluorescent material surrounding the
4 light source;

5 absorbing radiation in the fluorescent material,
6 said radiation being emitted by said light source;

7 emitting radiation from the fluorescent material,
8 the radiation having a wavelength in the range of
9 substantially 550 to 650nm; and

10 absorbing radiation in the wavelength range
11 substantially less than 500nm.

1 29. A system for providing pulsed light
2 comprising;

3 a pulsed toroidal flash tube incoherent light
4 source;

5 a reflector disposed about said incoherent light
6 source, said reflector having a cross-section of
7 substantially an ellipse, in a plane perpendicular to
8 the minor axis of the toroidal flash tube; and

9 at least one optical fiber having an end disposed
10 within said reflector.

1 30. The system of claim 29 wherein the major axis
2 of the ellipse forms a small angle with the major axis of
3 the toroidal flash tube.

1 31. The system of claim 29 wherein the reflector
2 is filled with a fluid.

1 32. The system of claim 29 wherein said reflector
2 is comprised of polished aluminum.

1 33. The system of claim 29 wherein the end of the
2 optical fiber has a cone shape.

1 34. The system of claim 29 wherein the optical
2 fiber is air clad.

1 35. The system of claim 29 wherein the end of the
2 optical fiber is flat.

1 36. The system of claim 29 further comprising:
2 a plurality of optical fibers, each having an end
3 disposed within the reflector; and
4 a linear to circular fiber transfer unit disposed
5 to receive light from the light source and provide light to
6 the optical fibers.

1 37. The system of claim 36 wherein the reflector
2 has an elliptical cross-section in a plane parallel to the
3 axis of the linear flash tube, and wherein the linear flash
4 tube is located at one focus of the ellipse while the linear
5 to circular transfer unit is located at the other focus of
6 the ellipse.

1 38. A system for the treatment of skin disorders
2 coupler comprising;

3 a pulsed toroidal flash tube incoherent light
4 source;

5 a reflector disposed about said incoherent light
6 source, said reflector having a cross-section of
7 substantially an ellipse, in a plane perpendicular to
8 the minor axis of the toroidal flash tube; and

9 at least one optical fiber having a first end
10 disposed within said reflector, and having a second end
11 capable of being disposed near a skin treatment area.

1 39. A system for invasive therapeutic application
2 of pulsed light comprising;

3 a pulsed toroidal flash tube incoherent light
4 source;

5 a reflector disposed about said incoherent light
6 source, said reflector having a cross-section of
7 substantially an ellipse, in a plane perpendicular to
8 the minor axis of the toroidal flash tube; and

9 at least one optical fiber having a first end
10 disposed within said reflector, and having a second end
11 capable of being inserted into a body in the immediate
12 vicinity of an organ for treatment.

1 40. A system for providing pulsed light for
2 material processing comprising;

3 a pulsed toroidal flash tube incoherent light
4 source;

5 a reflector disposed about said incoherent light
6 source, said reflector having a cross-section of
7 substantially an ellipse, in a plane perpendicular to
8 the minor axis of the toroidal flash tube; and

9 at least one optical fiber having a first end
10 disposed within said reflector, and having a second end
11 capable of being disposed near a material being
12 processed.

1 41. A system for providing pulsed light for
2 photography comprising;
3 a pulsed toroidal flash tube incoherent light
4 source;

5 a reflector disposed about said incoherent light
6 source, said reflector having a cross-section of
7 substantially an ellipse, in a plane perpendicular to
8 the minor axis of the toroidal flash tube; and

9 at least one optical fiber having a first end
10 disposed within said reflector, and having a second end
11 capable of being disposed near ~~a film treatment~~ area. ^{THE} BEING
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1 42. A system for the treatment of skin disorders
2 coupler comprising;

3 a pulsed toroidal flash tube incoherent light
4 source;

5 a reflector disposed about said incoherent light
6 source, said reflector having a cross-section of
7 substantially an ellipse, in a plane perpendicular to
8 the minor axis of the toroidal flash tube; and

9 at least one optical fiber having a first end
10 disposed within said reflector, and having a second end
11 capable of being disposed near a skin treatment area.

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